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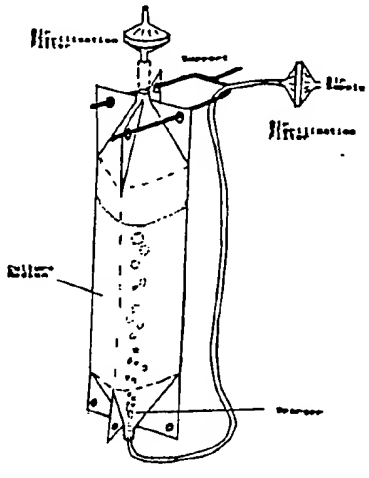
GB 1451925 GB 1380316 GB 1323622
EP A2 0099634 EP A2 0071365 EP A2 0057659

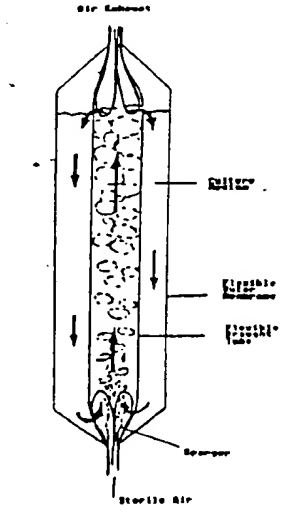
(58) Field of search
C6F
C6E
Selected US specifications from IPC sub-classes
C12M C12C C12G

(54) Foldable fermenter

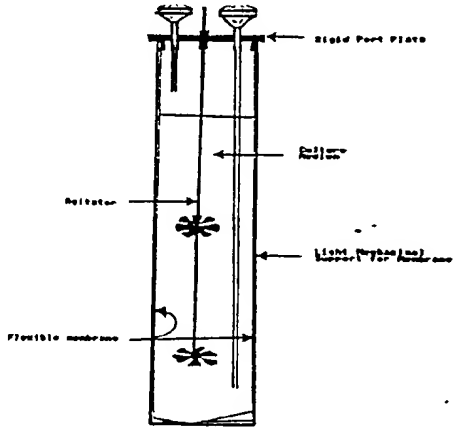
(57) A fermenter for plant, animal and microbial cell colture is constructed of a flexible material such that it may be folded for sterilisation or storage. The fermenter may include rigid components or a rigid external support neither of which will not interfere with the folding of the fermenter for sterilisation or storage.



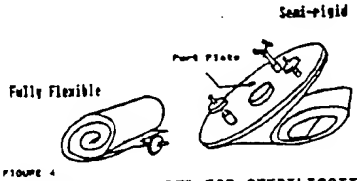
SMALL FERMENTER



AIR LIFT FERMENTER



MECHANICAL AGITATOR FERMENTER



FERMENTERS FOLDED FOR STERILISATION

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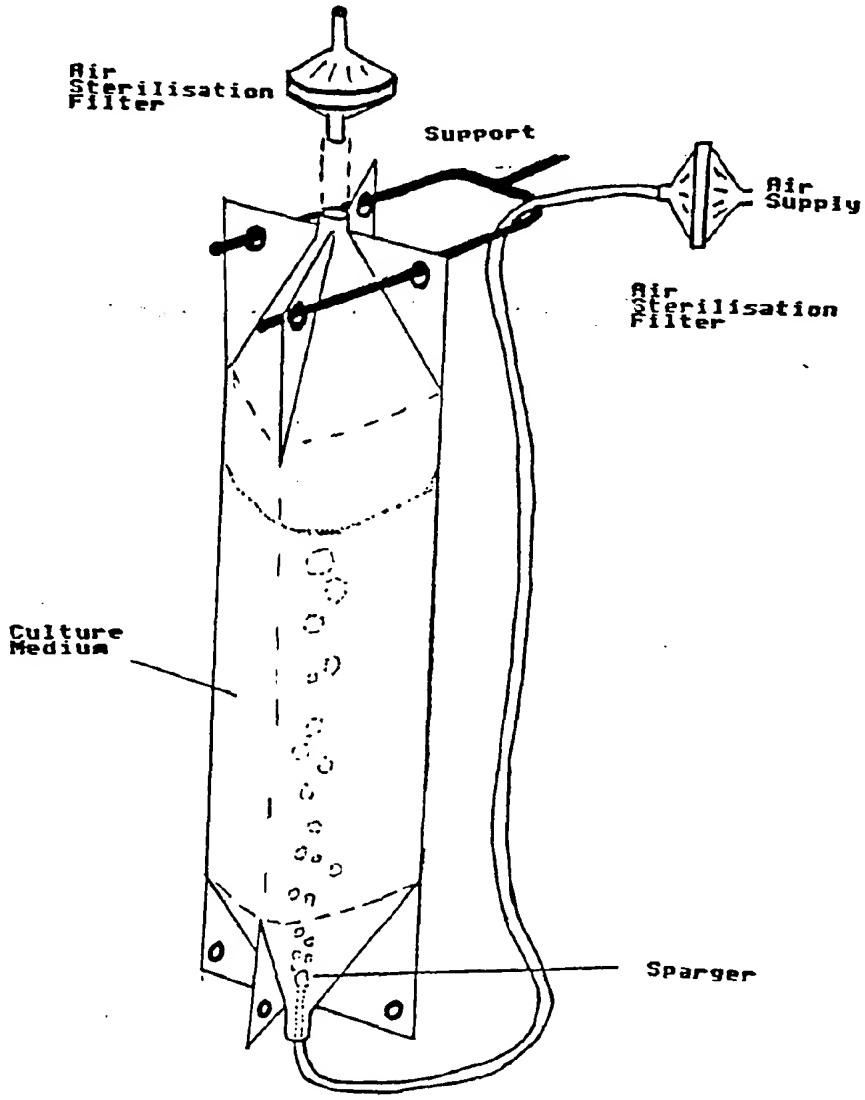

FIGURE 1

SMALL FERMENTER

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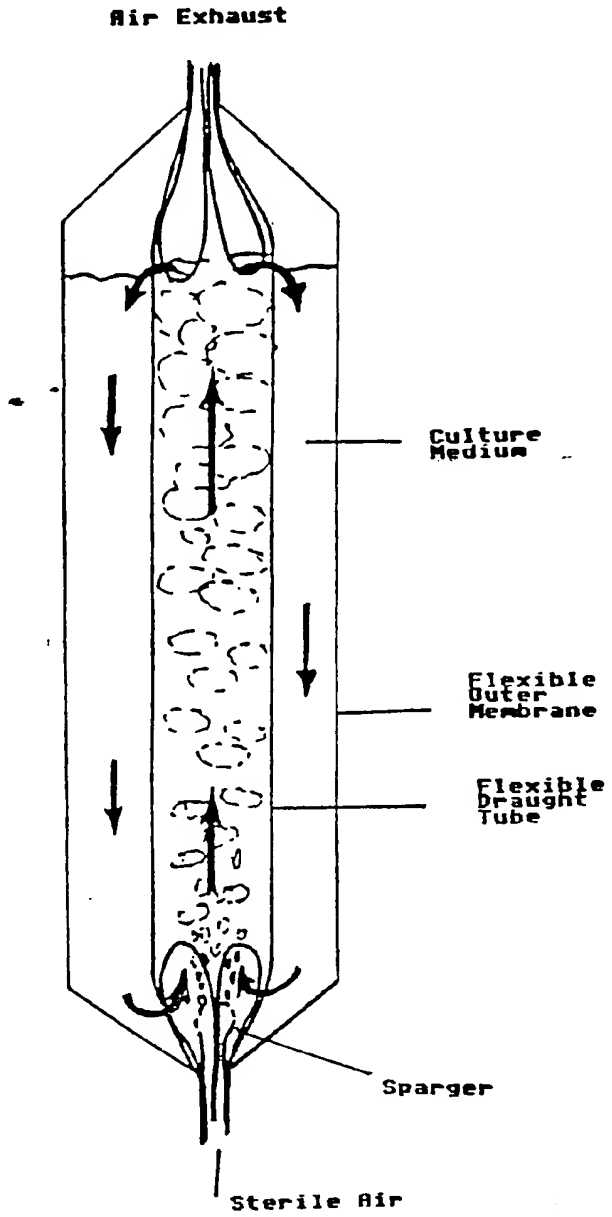

FIGURE 2

AIR LIFT FERMENTER

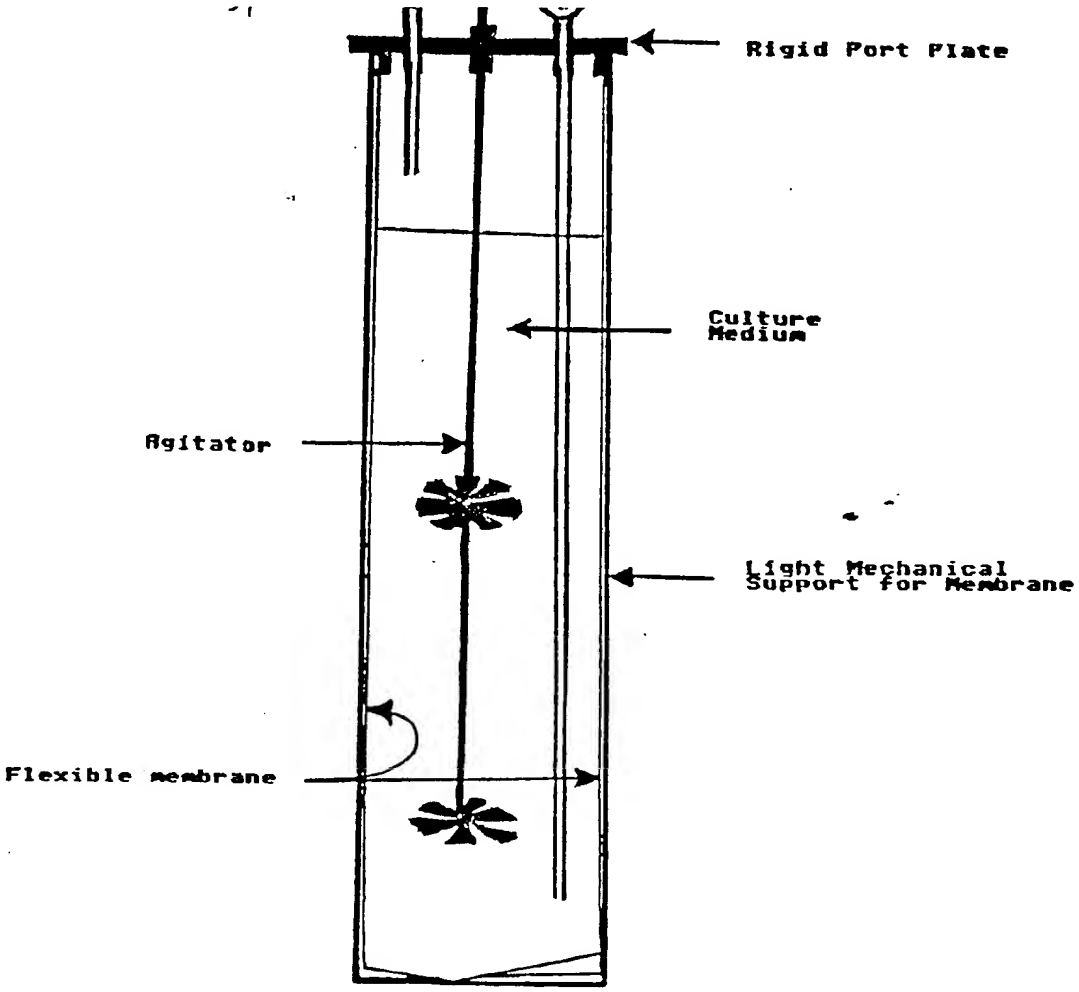

FIGURE 3

MECHANICAL AGITATOR FERMENTER

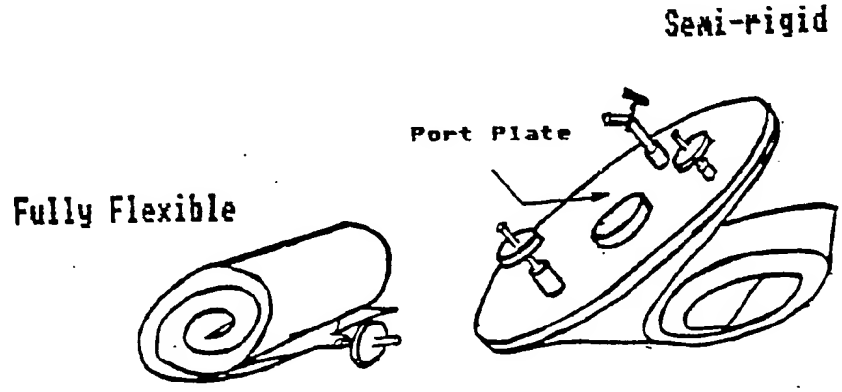

FIGURE 4

FERMENTERS FOLDED FOR STERILISATION

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FOLDABLE FERMENTER

This invention relates to the design and construction of fermenters for plant, animal and microbial cell culture.

There are many designs of fermenter but they all have in common the fact that they are rigid, i.e. cannot be folded into a small volume for sterilization and storage. This invention makes use of modern materials (e.g. plastics , plasitic composites and man-made fibres) for the construction of foldable fermenters. Small fermenters can be cheaply manufactured and being foldable need little storage space so that they can be kept in significant numbers ready for use when needed. Users would be expected to include schools, sixth form and other colleges of further education, universities, research institutes and commercial research laboratories. Larger foldable fermenters have the advantage over their rigid counterparts that they do not need to be constucted as a pressure vessel and sterilized with live steam. Even large foldable fermenters can be folded into a volume small enough to be sterilized in an autoclave of normal dimensions. This elimates the need for the fermenter to be massively constructed of stainless steel to withstand the pressure of steam sterilization, which is the usual method of construction and sterilization of large fermenters.

Small foldable fermenters can be hung from a simple stand but larger foldable fermenters may need additional support either in the form of multiple support points or an external cage. As this cage would not come into contact with the organism being cultured or the culture medium it need not be sterile or corrosion resistant.

In this invention the body of the fermenter is constructed of materials rendering it foldable. There may be rigid components such as ports or stirrers but these will not be such as to interfere with the folding of the fermenter (refered to later as semi-rigid). The fermenter will be constructed of materials capable of withstanding sterilisation by one or more of ; heat (wet or dry), radiation or chemicals.

Specific embodyments of this of this inv ntion will now be described by way of example with reference to accompanying drawings and photographs. The prototypes in the photographs are constructed of natural high density polypropylene 30 microns in thickness, but other materials and thicknesses may well prove suitable for both large and small scale foldable fermenters.

Figure 1. shows in perspective a small foldable fermenter sparged with a gas.

Figure 2. shows in section a small air-lift fermenter.

Figure 3. shows one design of a larger fermenter with support for the flexible membrane and a mechanical agitator .

Figure 4. shows a fully flexible and a semi-rigid fermenter folded for sterilisation or storage.

Photographs 1-3 show small fermenters empty and folded.

Photographs 4-5 show a small fermenter with a side port on a stand empty and full of culture medium.

Photogaph 6 shows a small fermenter without side port half filled with medium.

Photograph 7 shows a small flat bottomed isometric (cubic) fermenter sparged with air.

Photographs 8 & 9 show a small conical fermenter without and with aeration.

Photograph 10 shows various shapes of small fermenters empty and one folded for storage or sterilisation.

Photograph 11 shows the ability of the fermenter to cope with foaming of medium.

CLAIMS

1. A fermenter constructed of a flexible material such that the fermenter may be folded for sterilisation and storage. The flexible material being capable of withstanding sterilisation by one or more of , heat (wet or dry), chemicals , ionising radiation.

2. A fermenter constructed largely of a flexible material as claimed in claim 1. but including rigid components such as ports which will not interfere with the folding of the fermenter for sterilisation and storage.

3. A fermenter constructed of a flexible material as claimed in claims 1 & 2 but with a rigid external support which need not contact the organisms cultured and will therefore not need to be sterilisable or corrosion resistant.

Amendments to the claims
have been filed as follows

CLAIMS

1. A fermenter constructed of a flexible material such that the fermenter may be folded for sterilisation and storage. The fermenter to be fitted with bacteria-proof filters such that gases and, or liquids can enter or leave without microbially contaminating the fermenter. The whole structure being capable of withstanding sterilisation by one or more of , heat (wet or dry), chemicals , ionising radiation.

2. A fermenter constructed largely of a flexible material as claimed in claim 1. but including rigid components such as ports which will not interfere with the folding of the fermenter for sterilisation and storage.

3. A fermenter constructed of a flexible material as claimed in claims 1 & 2 but with a rigid external support which need not contact the organisms cultured and will therefore not need to be sterilisable or corrosion resistant.

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